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Kunzler & McKenzie
8 EAST BROADWAY
SUITE 600
SALT LAKE CITY, UT 84111

EXAMINER	
COUGHLAN, PETER D	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/644,378	FRY ET AL.	
	Examiner	Art Unit	
	Peter Coughlan	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-13,15-25 and 27-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-13,15-25 and 27-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *8/20/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. Claims 1-7, 9-13, 15-25, 27-40 are pending in this application.

Claim rejections – 35 USC §112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 7, 13, 18, 25, 30, 36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. These claims state the generation of a 'failure prediction algorithm.' There is no guidelines, algorithms or methods on how this 'prediction algorithm' is created and it is key to the application. All remaining portions of the independent revolve the existence of these 'failure prediction algorithms' but these exists no explanation on how it is accomplished. Claim 1 only states, 'an editor to assist a user in generating a failure prediction algorithm.' Claim 7 only states the 'failure prediction' somehow

exists. Claim 13 implies a 'failure prediction algorithm' exists due to the statement that an 'analysis module' to 'execute machine readable code programmed to selectively predict failure.' Claim 18 states 'generating a failure prediction algorithm' without explanation on how to obtain such an algorithm. Claim 25 'executes a failure prediction algorithm' without explaining how to obtain one. Claims 30 and 36only states 'generating a failure prediction algorithm' without an explanation on how this is accomplished.

Under section 2164.01(a) of the MPEP 7 areas need to be addressed for a test of enablement.

(A) The breadth of the claims. Some of these claims state that 'fuzzy logic rules' are used for the prediction algorithm. It gives no indication how these rules are to be created or if 'fuzzy logic rules are the only element in the 'failure prediction algorithm.'

(B) The nature of the invention. The nature of the invention is the ability to modify a failure prediction algorithm. The problem is that there is no explanation how the initial algorithm is generated. According to the claims and specification, it just happens. The Kanagawa reference will illustrate how deficit the specification is regarding this issue.

(C) The state of the prior art. The prior art illustrates how convoluted the problem of determining how to generate a failure prediction algorithm is. Any failure prediction algorithm can differ significance from another. Prior art gives no indication of how the failure prediction algorithm is to be designed.

(D) The level of one of ordinary skill. The level of skill is another factor

which varies the complication and detail which can be incorporated into a failure prediction algorithm.

(E) The level of predictability in the art. Concerning the problem with the claims is the assumption of the ability to initially generate a failure prediction algorithm. Predictability has little to do with this assumption.

(F) The amount of direction provided by the inventor. There are no pseudo code or code which would aid the Examiner on how to interpret the generation of a failure prediction algorithm. The specification only mentions that fuzzy logic rules are used without explanation.

(G) The existence of working examples. These exists no working examples within the specification which clarifies how to generate a failure prediction algorithm.

(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure. Since there can be numerous ways to design a failure prediction algorithm, the experimentation needed to make the prediction could be limitless.

In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

These claims and/or specification must be amended or the claims must be withdrawn from consideration.

Claim rejections – 35 USC §101

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 18-24 are rejected under 35 U.S.C. 101 for nonstatutory subject matter. The computer system must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application.

The invention as claimed and described within the specification is to the development of a failure prediction software. Both the claims and specification lack where the practical application of the invention. The result has to be a practical application. With no such application stated the invention is software per se and remains within the realm of being abstract.

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible and concrete." If the claim is directed to a practical application of the § 101 judicial exception producing a result tied to the physical world that does not preempt the judicial exception, then the claim meets the statutory requirement of 35 U.S.C. § 101.

The generation of a failure prediction algorithm from fuzzy logic rules, testing the failure prediction algorithm and revising the failure prediction algorithm is nothing more than an exercise.

The invention must be for a practical application and either:

1) specify transforming (physical thing) or

2) have the FINAL RESULT (not the steps) achieve or produce a

useful (specific, substantial, AND credible),

concrete (substantially repeatable/ non-unpredictable), AND

tangible (real world/ non-abstract) result.

What separates one application from another is the practical application in which the application provides. With no such application stated the invention is software per se and remains within the realm of being abstract. There must be a result that is a practical application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4, 25, 28, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanagawa in view of Hughes. ('Fixed Time Life Tests Based

On Fuzzy Life Characteristics', referred to as **'Kanagawa**; 'Improved Disk Drive Failure Warnings', referred to as **Hughes**)

Claim 1

Kanagawa teaches an editor to assist a user in generating a failure prediction algorithm comprising fuzzy logic rules, the failure prediction algorithm stored in a natural language format. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Editor' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

/Kanagawa does not teach a code generator to generate machine-readable code from the stored failure prediction algorithm in response to a user input.

Hughes teaches a code generator to generate machine-readable code from the stored failure prediction algorithm in response to a user input. (**Hughes,** p350, C2:35 through p351, C1:29; 'Code generator' of applicant is equivalent to the results of activating the application 'SMART' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by having standard computer components as taught by Hughes to have a code generator to generate

machine-readable code from the stored failure prediction algorithm in response to a user input.

For the purpose of being able to implement the failure prediction algorithm.

Kanagawa teaches a test module (**Kanagawa,** p317, C2:9-16; 'Test module' of applicant is equivalent to 'life test' of Kanagawa.) to test the machine-readable code with sample data to produce a result in response to a user input (**Kanagawa,** p317, C2:7-16; 'Sample data' of applicant is equivalent to 'n items be drawn at random' of Kanagawa.) a revision module to allow revisions of the failure prediction algorithm in response to a user input (**Kanagawa,** p318, C1:20 through p319, C1:20; 'Revision module to allow revisions' of applicant is illustrated by 'evaluating membership functions' 'for setting up the polynomial under some given discrete points, eg. spline-function, Legendre's polynomial, linear multiple regression' of Kanagawa.) result corresponds to an expected result. (**Kanagawa,** p317, C2:17, through p318, C1:19; 'Expected results' of applicant is determined by either '$\mu_1(\theta)$ or $\mu_0(\theta)$' of Kanagawa.)

Claim 4

Kanagawa does not teach the machine-readable code is configured to execute on a storage system.

Hughes teaches the machine-readable code is configured to execute on a storage system. (**Hughes,** abstract; 'Machine readable code' of applicant is

equivalent to the application SMART of Hughes. 'Execute on a storage system' of applicant is disclosed by 'disk drive failure prediction' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by making an application example a storage system as taught by Hughes to have the machine-readable code is configured to execute on a storage system.

For the purpose of evaluating the present condition of the storage device and be able to predict a future status of the storage device.

Claim 25

Kanagawa teaches gathering performance data for a storage system (**Kanagawa,** p317, C2:7-16; 'Gathering performance data' of applicant is illustrated by the ability to have 'n items be drawn at random' of Kanagawa.) executing a failure prediction algorithm on the performance data to produce a result, the failure prediction algorithm comprising fuzzy logic rules tuning the failure prediction algorithm by adjusting a fuzzy variable definition (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Adjusting' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Kanagawa does not teach selectively forecasting failure of one or more components of the storage system in response to the result.

Hughes teaches selectively forecasting failure of one or more components of the storage system in response to the result. (**Hughes,** abstract; 'forecasting failure' of a storage system' of applicant is disclosed by 'disk drive failure prediction' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to predict the status of a single component as taught by Hughes to have selectively forecasting failure of one or more components of the storage system in response to the result.

For the purpose of providing actions that pertain to a single storage device instead of all the storage devices.

Claim 28

Kanagawa does not teach producing a notification in response to the result.

Hughes teaches producing a notification in response to the result. (**Hughes,** p351, C1:40 to C2:4; 'Notification' of applicant is illustrated by the result 'won't-fail/will fail' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to produce a result as taught by Hughes to have produce a notification in response to the result.

For the purpose of the end user being able to review the result.

Claim 29

Kanagawa teaches pre-processing performance data to provide input data for the failure prediction algorithm. (**Kanagawa,** p317, C2:7-16; 'Pre-processor configured to preprocess performance data' of applicant is illustrated by the ability to have 'n items be drawn at random' of Kanagawa.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 6, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa and Hughes in view of Cox. ('Fuzzy Fundamentals', referred to as **Cox**)

Claim 2

Kanagawa and Hughes do not teach linguistic variables having less than four terms.

Cox teaches linguistic variables having less than four terms. (**Cox,** p58, C2:14-24; 'Less than four terms' of applicant is illustrated by the examples of the variables of 'warm' and 'not very fast' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by using less than 4 variables as taught by Cox to have linguistic variables having less than four terms.

For the purpose of keeping the fuzzy rules simple and easy to understand.

Claim 6

Kanagawa and Hughes do not teach the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

Cox teaches the fuzzy logic rules are defined by conditional statements (**Cox,** p58, C2:14-24; 'Conditional statements' of applicant is illustrated by the examples of 'if' and 'and' of Cox.) that include subjects, adjectives, and verbs familiar to personnel in the storage system field. (**Cox,** p58, C2:14-24; 'Subjects, adjectives and verbs' of applicant is illustrated by the example 'brake temperature is warm', 'speed is not very fast, and 'brake pressure is slightly decreased' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of

Kanagawa and Hughes by using a normal condition statements that are associated with fuzzy operations as taught by Cox to have the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

For the purpose of incorporating ease of use of the invention.

Claim 27

Kanagawa and Hughes do not teach mapping the result to one of a plurality of predefined recommendations.

Cox teaches mapping the result to one of a plurality of predefined recommendations. (**Cox,** p60, C1:8-15; Examples of 'predefined recommendations' of applicant is equivalent to 'throttle action is (PL or PM or ZR or NM)' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by using normal fuzzy operations such as predefined recommendations as taught by Cox to have mapping the result to one of a plurality of predefined recommendations.

For the purpose of improved speed of determining a final result.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa and Hughes in view of Andrade. ('A layer based computational model plus a data base structure as a framework to build parallel fuzzy controllers', referred to as **Andrade**)

Claim 5

Kanagawa and Hughes do not teach the revision module comprises a text editor to revise the failure prediction algorithm in response to a user input.

Andrade teaches the revision module comprises a text editor to revise the failure prediction algorithm in response to a user input. (**Andrade,** p165, C2:34 through p166, C1:7; 'Text editor' of applicant is equivalent to 'general text editor' of Andrade.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by using a word processor as taught by Andrade to have

the revision module comprises a text editor to revise the failure prediction algorithm in response to a user input.

For the purpose of using standard technology to implement data input or modification which lowers training costs.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 7 ,9, 10, 13 15-18, 22, 30, 33, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa and Hughes in view of Wavish. ('U. S. Patent 5832467', referred to as **Wavish**)

Claim 3

Kanagawa and Hughes do not teach the test module further tunes the failure prediction algorithm by adjusting a fuzzy variable definition in response to a user input.

Wavish teaches the test module further tunes the failure prediction algorithm by adjusting a fuzzy variable definition in response to a user input. (Wavish, C9:54-67, C2:5-26; 'User input' of applicant is equivalent to 'user input' of Wavish. 'Adjusting' a 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by being able to alter the algorithm as taught by Wavish to have the test module further tunes the failure prediction algorithm by adjusting a fuzzy variable definition in response to a user input.

For the purpose of having the algorithm fit the incoming data for improved accuracy.

Claim 7

Kanagawa does not teach a performance monitor to gather performance data for a storage system a processor.

Hughes teaches a performance monitor to gather performance data for a storage system (**Hughes,** p350, C2:35 through p351, C1:29; 'Gather

performance data' of applicant is equivalent to 'monitoring a number of internal drive measurements' of a Hughes.) a processor. (**Hughes,** p350, C2:35 through p351, C1:29; 'processor' of applicant is equivalent to 'microprocessor' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by collecting data as taught by Hughes to have a performance monitor to gather performance data for a storage system a processor.

For the purpose of having data to perform a failure prediction.

Kanagawa teaches to execute a failure prediction algorithm on the performance data to produce a result, the failure prediction algorithm comprising fuzzy logic rules. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Editor' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Kanagawa does not teach a determination module to selectively forecast failure of one or more components of the storage system in response to the result.

Hughes teaches a determination module to selectively forecast failure of one or more components of the storage system in response to the result. (**Hughes,** p350, C2:35 through p351, C1:29; 'Determination module' of applicant

is disclosed by the results of 'SMART' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by predicting failure as taught by Hughes to have a determination module to selectively forecast failure of one or more components of the storage system in response to the result.

For the purpose of finding out a single component that is going to fail to lower cost of replacing one instead of all of the components.

Kanagawa and Hughes do not teach an interface to adjust a predefined quality threshold of the determination module in response to a user input, thereby adjusting the degree of data loss risk and remedial cost associated with a forecasted failure of one or more components.

Wavish teaches an interface to adjust a predefined quality threshold of the determination module in response to a user input, thereby adjusting the degree of data loss risk and remedial cost associated with a forecasted failure of one or more components. (**Wavish,** C9:54-67, C2:5-26; 'User input' of applicant is equivalent to 'user input' of Wavish. 'Interface' of applicant is equivalent to 'interface' of Wavish. 'Adjusting' a 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by being able to adjust the algorithm as taught by Wavish to have an interface to adjust a predefined quality

threshold of the determination module in response to a user input, thereby adjusting the degree of data loss risk and remedial cost associated with a forecasted failure of one or more components.

For the purpose of having an algorithm's result fit the incoming test data.

Claim 9

Kanagawa and Hughes do not teach an interface to adjust a fuzzy variable definition to tune the failure prediction algorithm in response to user input.

Wavish teaches an interface to adjust a fuzzy variable definition to tune the failure prediction algorithm in response to user input. (**Wavish,** C9:54-67, C2:5-26; 'User input' of applicant is equivalent to 'user input' of Wavish. 'Interface' of applicant is equivalent to 'interface' of Wavish. 'Adjusting' a 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by having an interface as taught by Wavish to have an interface to adjust a fuzzy variable definition to tune the failure prediction algorithm in response to user input.

For the purpose of having an interface to the algorithm such that the variables can be adjusted.

Claim 10

Kanagawa teaches a pre-processor configured to pre-process performance data to provide input data for the failure prediction algorithm. (**Kanagawa,** p317, C2:7-16; 'Pre-processor configured to preprocess performance data' of applicant is illustrated by the ability to have 'n items be drawn at random' of Kanagawa.)

Claim 13

Kanagawa and Hughes do not teach a controller to control and manage data transactions with a host a communication module to exchange data between the host and a storage media a drive mechanism to read data from the storage media and write data to the storage media an analysis module to execute machine-readable code programmed to selectively predict failure of the storage media.

Wavish teaches a controller to control and manage data transactions with a host (**Wavish,** C9:35-53; 'Controller' of applicant is equivalent to 'instruction set' of Wavish.) a communication module to exchange data between the host and a storage media (**Wavish,** C9:54-67; 'Communication module' of applicant is equivalent to 'data bus' of Wavish.) a drive mechanism to read data from the storage media and write data to the storage media (**Wavish,** C9:35-53; 'Read data' of applicant is equivalent to 'discrete storage areas' which 'holds the table containing the element number EN, state S, queued status Q and propagate

function start addresses' of Wavish. 'Write data' of applicant is disclosed by the ability to 'provide further storage areas for future agent and prediction module element state changes' of Wavish.) an analysis module to execute machine-readable code programmed to selectively predict failure of the storage media. (**Wavish,** C9:54-67; 'Analysis module' of applicant is equivalent to CPU of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by having common computer components as taught by Wavish to have a controller to control and manage data transactions with a host a communication module to exchange data between the host and a storage media a drive mechanism to read data from the storage media and write data to the storage media an analysis module to execute machine-readable code programmed to selectively predict failure of the storage media.

For the purpose of using standard computer components, the invention can be used in a standard computer.

Kanagawa teaches the drive mechanism in response to a result from a failure prediction algorithm comprising fuzzy logic rules and performance data associated with the storage media and the drive mechanism. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa.)

Kanagawa and Hughes do not teach the machine-readable code further comprises an interface.

Wavish teaches the machine-readable code further comprises an interface. (**Wavish,** C9:54-67, C2:5-26; 'Interface' of applicant is equivalent to 'interface' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by having an interface as taught by Wavish to have the machine-readable code further comprises an interface.

For the purpose of the user to be able to modify the variables of the prediction algorithm.

Kanagawa teaches to selectively adjust a fuzzy variable definition to tune the failure prediction algorithm in response to user input. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Selectively adjust' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Claim 15

Kanagawa teaches the machine-readable code further comprises a pre-processor to pre-process performance data to provide input data for the failure prediction algorithm. (**Kanagawa,** p317, C2:7-16; 'Pre-processor configured to preprocess performance data' of applicant is illustrated by the ability to have 'n items be drawn at random' of Kanagawa.)

Claim 16

Kanagawa does not teach the machine-readable code further comprises a determination module to map a result from the failure prediction algorithm to one of a plurality of predefined recommendations.

Hughes teaches the machine-readable code further comprises a determination module to map a result from the failure prediction algorithm to one of a plurality of predefined recommendations. (**Hughes,** p350, C2:35 through p351, C1:29; 'Determination module' of applicant is disclosed by the results of 'SMART' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by having a set of recommendations as taught by Hughes to have the machine-readable code further comprises a determination module to map a result from the failure prediction algorithm to one of a plurality of predefined recommendations.

For the purpose of having no computation costs for a final recommendation, due to the fact they are all already computed.

Claim 17

Kanagawa does not teach the machine-readable code further comprises a notification module to produce a notification in response to the result.

Hughes teaches the machine-readable code further comprises a notification module to produce a notification in response to the result. (**Hughes,** p351, C1:40 to C2:4; 'Notification module' of applicant is illustrated by the result 'won't-fail/will fail' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to produce a result as taught by Hughes to have the machine-readable code further comprises a notification module to produce a notification in response to the result.

For the purpose of being able to produce a result for the user to review.

Claim 18

Kanagawa teaches generating a failure prediction algorithm comprising fuzzy logic rules, the failure prediction algorithm stored in a natural language format. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Editor' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Kanagawa does not teach generating machine-readable code from the stored failure prediction algorithm testing the machine-readable code to produce a result.

Hughes teaches generating machine-readable code from the stored failure prediction algorithm (**Hughes,** p350, C2:35 through P351, C1:4; The ability to 'generate machine readable code' of applicant is equivalent to running the 'SMART' application of Hughes.) testing the machine-readable code to produce a result. (**Hughes,** abstract; 'testing' of applicant is equivalent to 'test' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to compile an application as taught by Hughes to generating machine-readable code from the stored failure prediction algorithm testing the machine-readable code to produce a result.

For the purpose of being able to use the application, the application must be able to be compiled.

Kanagawa and Hughes do not teach selectively revising the failure prediction algorithm such that the result corresponds.

Wavish teaches selectively revising the failure prediction algorithm such that the result corresponds. (**Wavish,** C9:54-67, C2:5-26; 'Selectively revising' an 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by being able to edit the algorithm as taught by Wavish to selectively revising the failure prediction algorithm such that the result corresponds.

For the purpose of being able to modify the algorithm such that the results of the algorithm can match the test data.

Kanagawa teaches an expected result. (**Kanagawa,** p317, C2:17, through p318, C1:19; 'Expected results' of applicant is equivalent to either 'μ_1 (θ) or μ_0 (θ)' of Kanagawa.)

Claim 22

Kanagawa does not teach the machine-readable code is configured to execute on a storage system.

Hughes teaches the machine-readable code is configured to execute on a storage system. (**Hughes,** abstract; 'Machine readable code' of applicant is equivalent to the application SMART of Hughes. 'Execute on a storage system' of applicant is disclosed by 'disk drive failure prediction' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by having the focus of the application is concerned with the status of the storage device as taught by Hughes to have the machine-readable code is configured to execute on a storage system.

For the purpose of obtaining the current status of a storage device and being able to produce a prediction of the future status of the storage device.

Claim 30

Kanagawa teaches means for generating a failure prediction algorithm comprising fuzzy logic rules, the failure prediction algorithm stored in a natural language format. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Editor' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Kanagawa does not teach means for generating machine-readable code from the stored failure prediction algorithm means for testing the machine-readable code to produce a result.

Hughes teaches means for generating machine-readable code from the stored failure prediction algorithm (**Hughes,** p350, C2:35 through P351, C1:4; The ability to 'generate machine readable code' of applicant is equivalent to running the 'SMART' application of Hughes.) means for testing the machine-readable code to produce a result. (**Hughes,** abstract; 'Testing' of applicant is equivalent to 'test' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to compile the application as taught by Hughes to have the means for generating machine-readable code from the stored failure prediction algorithm means for testing the machine-readable code to produce a result.).

For the purpose of being able to use the application, the application must first be able to compile.

Kanagawa and Hughes do not teach means for selectively revising the failure prediction algorithm such that the result corresponds.

Wavish teaches means for selectively revising the failure prediction algorithm such that the result corresponds. (**Wavish,** C9:54-67, C2:5-26; 'Selectively revising' an 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by having access to the prediction algorithm as taught by Wavish to have selectively revising the failure prediction algorithm such that the result corresponds.

For the purpose of editing the algorithm in such a manner the results of the algorithm match the test data.

Kanagawa teaches an expected result. (**Kanagawa,** p317, C2:17, through p318, C1:19; 'Expected results' of applicant is equivalent to either '$\mu_1(\theta)$ or $\mu_0(\theta)$' of Kanagawa.)

Claim 33

Kanagawa does not teach the machine-readable code is configured to execute on a storage system.

Hughes teaches the machine-readable code is configured to execute on a storage system. (**Hughes,** abstract; 'Machine readable code' of applicant is equivalent to the application SMART of Hughes. 'Execute on a storage system' of applicant is disclosed by 'disk drive failure prediction' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by having the focus of the application which is centered on the storage device as taught by Hughes to have the machine-readable code is configured to execute on a storage system.

For the purpose of obtaining the current status of a storage device and being able to produce a prediction of the future status of the storage device.

Claim 36

Kanagawa teaches generating a failure prediction algorithm comprising fuzzy logic rules, the failure prediction algorithm stored in a natural language format. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Failure prediction algorithm' of applicant is equivalent to 'reliability demonstration test' of Kanagawa. 'Fuzzy logic rules' of applicant is equivalent to fuzzy theory' of Kanagawa. 'Editor' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Kanagawa does not teach generating machine-readable code from the stored failure prediction algorithm testing the machine-readable code to produce a result.

Hughes teaches generating machine-readable code from the stored failure prediction algorithm (**Hughes,** p350, C2:35 through P351, C1:4; The ability to 'generate machine readable code' of applicant is equivalent to running the 'SMART' application of Hughes.) testing the machine-readable code to produce a result. (**Hughes,** abstract; 'Testing' of applicant is equivalent to 'test' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to compile a application as taught by Hughes to generate machine-readable code from the stored failure prediction algorithm testing the machine-readable code to produce a result.

For the purpose of applying the application to determine the future status of a storage device.

Kanagawa and Hughes do not teach selectively revising the failure prediction algorithm such that the result corresponds.

Wavish teaches selectively revising the failure prediction algorithm such that the result corresponds. (**Wavish,** C9:54-67, C2:5-26; 'Selectively revising' an 'prediction algorithm' of applicant is equivalent to 'selectively modify ... until a level of accuracy in accordance with said predetermined criteria' of Wavish.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa and Hughes by having access to the algorithm as taught by Wavish to selectively revising the failure prediction algorithm such that the result corresponds.

For the purpose of fine tuning the algorithm for improved accuracy.

Kanagawa teaches an expected result. (**Kanagawa,** p317, C2:17, through p318, C1:19; 'Expected results' of applicant is equivalent to either '$\mu_1(\theta)$ or $\mu_0(\theta)$' of Kanagawa.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11, 12, 19, 20, 24, 31, 35, 37, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa, Hughes and Wavish in view of Cox. ('Fuzzy Fundamentals', referred to as **Cox**)

Claim 11

Kanagawa does not teach the determination module maps the result.

Hughes teaches the determination module maps the result. (**Hughes,** p350, C2:35 through p351, C1:29; 'Determination module' of applicant is

disclosed by the results of 'SMART' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by having a results in a predetermined form as taught by Hughes to have the determination module maps the result.

For the purpose of not having any resulting computation costs.

Kanagawa, Hughes and Wavish from the failure prediction algorithm to one of a plurality of predefined recommendations.

Cox teaches from the failure prediction algorithm to one of a plurality of predefined recommendations. (**Cox,** p60, C1:8-15; Examples of 'predefined recommendations' of applicant is equivalent to 'throttle action is (PL or PM or ZR or NM)' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by having a predefined results as taught by Cox to have the failure prediction algorithm to one of a plurality of predefined recommendations.

For the purpose of not accumulating any cost for generating a result, due to the fact they are already computed.

Claim 12

Kanagawa does not teach a notification module configured to produce a notification in response to the result.

Hughes teaches a notification module configured to produce a notification in response to the result. (**Hughes,** p351, C1:40 to C2:4; 'Notification module' of applicant is illustrated by the result 'won't-fail/will fail' of Hughes.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Kanagawa by being able to produce a result as taught by Hughes to have a notification module configured to produce a notification in response to the result.

For the purpose of having a result that can be outputted for a user to review.

Claim 19

Kanagawa, Hughes and Wavish the fuzzy logic rules comprise linguistic variables having less than four terms.

Cox teaches the fuzzy logic rules comprise linguistic variables having less than four terms. (**Cox,** p58, C2:14-24; 'Less than four terms' of applicant is illustrated by the examples of the variables of 'warm' and 'not very fast' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by keeping the rules simple as taught by Cox to have the fuzzy logic rules comprise linguistic variables having less than four terms.

For the purpose of increased ease of understanding the rules for possible modification purposes.

Claim 20

Kanagawa, Hughes and Wavish wherein certain linguistic variables comprise less than three terms.

Cox teaches wherein certain linguistic variables comprise less than three terms. (**Cox,** p58, C2:14-24; 'Less than four terms' of applicant is illustrated by the examples of the variables of 'warm' and 'not very fast' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by keeping the rules even simpler as taught by Cox to have --- (copy what the applicant claims).

For the purpose of increased ease of understanding the rules for possible modification purposes.

Claim 24

Kanagawa, Hughes and Wavish the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

Cox teaches the fuzzy logic rules are defined by conditional statements (**Cox,** p58, C2:14-24; 'Conditional statements' of applicant is illustrated by the examples of 'if' and 'and' of Cox.) that include subjects, adjectives, and verbs familiar to personnel in the storage system field. (**Cox,** p58, C2:14-24; 'Subjects, adjectives and verbs' of applicant is illustrated by the example 'brake temperature is warm', 'speed is not very fast, and 'brake pressure is slightly decreased' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by using natural language as taught by Cox to have the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

For the purpose of generating or modifying the rules in a natural language lowers the learning curve of understanding the invention and associated rules.

Claim 31

Kanagawa, Hughes and Wavish the fuzzy logic rules comprise linguistic variables having less than four terms.

Cox teaches the fuzzy logic rules comprise linguistic variables having less than four terms. (**Cox,** p58, C2:14-24; 'Less than four terms' of applicant is illustrated by the examples of the variables of 'warm' and 'not very fast' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes

and Wavish by keeping the rules simple as taught by Cox to have the fuzzy logic rules comprise linguistic variables having less than four terms.

For the purpose of having a simple, easy structure of the rules which enables the understanding of the rules and ease of modification.

Claim 35

Kanagawa, Hughes and Wavish the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

Cox teaches the fuzzy logic rules are defined by conditional statements (**Cox,** p58, C2:14-24; 'Conditional statements' of applicant is illustrated by the examples of 'if' and 'and' of Cox.) that include subjects, adjectives, and verbs familiar to personnel in the storage system field. (**Cox,** p58, C2:14-24; 'Subjects, adjectives and verbs' of applicant is illustrated by the example 'brake temperature is warm', 'speed is not very fast, and 'brake pressure is slightly decreased' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by using natural language as taught by Cox to have the fuzzy logic rules are defined by conditional statements that include subjects, adjectives, and verbs familiar to personnel in the storage system field.

For the purpose of generating or modifying the rules in a natural language lowers the learning curve of understanding the invention and associated rules.

Claim 37

Kanagawa, Hughes and Wavish the fuzzy logic rules comprise simple statements that include subjects, adjectives, and verbs that are commonly used to describe error conditions of a storage system.

Cox teaches the fuzzy logic rules comprise simple statements (**Cox,** p58, C2:14-24; 'Statements' of applicant is illustrated by the examples of 'if' and 'and' of Cox.) that include subjects, adjectives, and verbs that are commonly used to describe error conditions of a storage system. (**Cox,** p58, C2:14-24; 'Subjects, adjectives and verbs' of applicant is illustrated by the example 'brake temperature is warm', 'speed is not very fast, and 'brake pressure is slightly decreased' of Cox.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes and Wavish by using natural language as taught by Cox to have the fuzzy logic rules comprise simple statements that include subjects, adjectives, and verbs that are commonly used to describe error conditions of a storage system.

For the purpose of generating or modifying the rules in a natural language lowers the learning curve of understanding the invention and associated rules.

Claim 38

Kanagawa teaches tuning the failure prediction algorithm by adjusting a fuzzy variable definition. (**Kanagawa,** p318, C1:20 through p319, C1:20, p317, C1:14-27; 'Tuning' of applicant is disclosed by the fact that 'the coefficients a_{ij} must be chosen so that the membership functions are continuous' of Kanagawa.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 23, 34, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa, Hughes, Wavish and Cox in view of Andrade. ('A layer based computational model plus a data base structure as a framework to build parallel fuzzy controllers', referred to as **Andrade**)

Claim 23

Kanagawa, Hughes, Wavish and Cox do not teach revising the failure prediction algorithm by way of a text editor.

Andrade teaches revising the failure prediction algorithm by way of a text editor. (**Andrade,** p165, C2:34 through p166, C1:7; 'Text editor' of applicant is equivalent to 'general text editor' of Andrade.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish and Cox by using a word processor as taught by Andrade to have revising the failure prediction algorithm by way of a text editor.

For the purpose of using a word processor to edit rules which are already in a natural language form lowers learning costs of rule modification.

Claim 34

Kanagawa, Hughes, Wavish and Cox do not teach means for revising the failure prediction algorithm by way of a text editor.

Andrade teaches means for revising the failure prediction algorithm by way of a text editor. (**Andrade,** p165, C2:34 through p166, C1:7; 'Text editor' of applicant is equivalent to 'general text editor' of Andrade.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish and Cox by using a word processor as taught by Andrade to have means for revising the failure prediction algorithm by way of a text editor.

For the purpose of using a word processor to edit rules which are already in a natural language form lowers learning costs of rule modification.

Claim 39

Kanagawa, Hughes, Wavish and Cox do not teach revising the failure prediction algorithm by way of a text editor.

Andrade teaches revising the failure prediction algorithm by way of a text editor. (**Andrade,** p165, C2:34 through p166, C1:7; 'Text editor' of applicant is equivalent to 'general text editor' of Andrade.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish and Cox by using a word processor as taught by Andrade to have revising the failure prediction algorithm by way of a text editor.

For the purpose of using a word processor to edit rules which are already in a natural language form lowers learning costs of rule modification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 21, 32, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kanagawa, Hughes, Wavish, Cox and Andrade in view of Vaneck. ('Fuzzy guidance controller for an autonomous boat', referred to as **Vaneck**)

Claim 21

Kanagawa, Hughes, Wavish, Cox and Andrade do not teach tuning the failure prediction algorithm by adjusting a fuzzy variable definition.

Vaneck teaches tuning the failure prediction algorithm by adjusting a fuzzy variable definition. (**Vaneck,** p46, C1:16 through p47, C1:6; 'Tuning' by 'adjusting a fuzzy variable condition' of applicant is equivalent to 'if a different response is desired for a particular range of input variables, then only a few FAM rules would need to be altered' of Vaneck.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish, Cox and Andrade by adjusting the algorithm as taught by Vaneck to tuning the failure prediction algorithm by adjusting a fuzzy variable definition.

For the purpose of having the data conform to the prediction model.

Claim 32

Kanagawa, Hughes, Wavish, Cox and Andrade do not teach means for tuning the failure prediction algorithm by adjusting a fuzzy variable definition.

Vaneck teaches means for tuning the failure prediction algorithm by adjusting a fuzzy variable definition. (**Vaneck,** p46, C1:16 through p47, C1:6; 'Tuning' by 'adjusting a fuzzy variable condition' of applicant is equivalent to 'if a different response is desired for a particular range of input variables, then only a few FAM rules would need to be altered' of Vaneck.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish, Cox and Andrade by adjusting the algorithm as taught by Vaneck to have means for tuning the failure prediction algorithm by adjusting a fuzzy variable definition.

For the purpose of having the prediction algorithm fit the data.

Claim 40

Kanagawa, Hughes, Wavish, Cox and Andrade do not teach adding fuzzy logic rules to the failure prediction algorithm.

Vaneck teaches adding fuzzy logic rules to the failure prediction algorithm. (**Vaneck,** p47, C1:7-20; 'Adding fuzzy logic rules' of applicant is disclosed by the addition of the addition of a fourth scale, 'medium' of Vaneck.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Kanagawa, Hughes, Wavish, Cox

and Andrade by making additions to the rules as taught by Vaneck to add fuzzy logic rules to the failure prediction algorithm.

For the purpose of making adjustments to the failure prediction algorithm which were not initially conceived.

Conclusion

3. The prior art of record and not relied upon is considered pertinent to the applicant's disclosure.

-'Decision support system in a design for assembly and disassembly methodology': Mascle

-'A fuzzy Petri net-based expert system and its application to damage assessment of bridges': Lee

-'A fuzzy logic based smart automatic windshield wiper': Cheok

4. Claims 1-7, 9-13, 15-25, 27-40 are rejected.

Correspondence Information

5. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3080. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

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401 Dulany Street,

Alexandria, Virginia 22313,

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Peter Coughlan

1/22/2008

1/29/08

DAVID VINCENT
SUPERVISORY PATENT EXAMINER